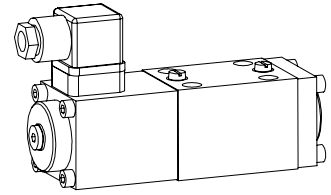


**Solenoid operated spool valve with soft switching**

- 4/2-way with 2 solenoids
- 4/3-way with spring centred mid position
- 4/2-way with spring reset
- $Q_{max} = 30 \text{ l/min}$ ,  $p_{max} = 350 \text{ bar}$

**NG6**  
ISO 4401-03


**DESCRIPTION**

Spool valve with soft switching, NG6 flange construction in accordance to ISO 4401-03 with 4 connections. Solenoids to norme VDE 0580. Direct solenoid operated spool valve with a 5 annular chamber body design. The valve's with soft switching characteristic is achieved by means of an optimum combination of removable orifice and piston design. Solenoid wet pin oil immersed armature type. Precision honed spool for low leakage. Low pressure drop due to the body design and spool profiling. Spool is of hardened steel, body is of high grade hydraulic cast iron for long service life. Wide range of standard and special voltages in 2 solenoid versions. The valve body is painted, the cover and the solenoid are zinc coated.

**FUNCTION**

The solenoid shifts the spool into the corresponding position.

- 4/2-way  
Two solenoids and 2 switch settings. 100% ED holds the switch setting on the solenoid (no mechanical detente).
- 4/3-way spool valve:  
2 solenoids and 3 spool positions, spring centered. With the solenoids deenergised the spool returns to the center position.
- 4/2-way spool valve:  
1 solenoid and 2 spool positions, spring offset. With the solenoid deenergised the spool returns to the offset position.

**APPLICATION**

Normal solenoid spool valves switch very quickly. This can induce shocks in the hydraulic system which can cause mechanical wear and have a negative effect on performance. The soft switching valves slow down and dampen the switching movements. All starting, stopping and oscillating movements are done softly, which benefits the system. Optimum results can be achieved if all ports are connected and the valve is properly bleed of air. Individual settings are available on request.

**Important:** at the time the valve is taken into service, the valve must be vented under pressure (max. 2 revolutions of screw E).

**CONTENT**

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**TYPE CODE**

	A	W	4	-	/	#
International mounting interface ISO						
Medium-solenoid <span style="border: 1px solid black; padding: 0 2px;">M</span>						
Super-solenoid <span style="border: 1px solid black; padding: 0 2px;">S</span>						
Soft switching						
Number of control ports						
Description of symbols acc. to table 1.4-30/2						
Standard- nominal voltage $U_N$ :	12 VDC <span style="border: 1px solid black; padding: 0 2px;">G12</span>	110 VAC <span style="border: 1px solid black; padding: 0 2px;">R110</span>				
	24 VDC <span style="border: 1px solid black; padding: 0 2px;">G24</span>	115 VAC <span style="border: 1px solid black; padding: 0 2px;">R115</span>				
		230 VAC <span style="border: 1px solid black; padding: 0 2px;">R230</span>				
Orifice area:	$\emptyset 0,3$	Standard type no remark				
	$\emptyset 0,5$ <span style="border: 1px solid black; padding: 0 2px;">0,5</span>					
Design-Index (Subject to change)						

**GENERAL SPECIFICATIONS**

Description	4/2-, 4/3-way spool valve
Nominal size	NG6 to ISO 4401-03
Construction	Direct operated spool valve
Operations	Solenoid
Mounting	Flange 4 fixing holes for socket head cap screw M5x45
Connections	Threaded connection plates Multi-flange subplates Longitudinal stacking system
Ambient temperature	-20...+50°C
Mounting position	any, preferably horizontal
Fastening torque	$M_D = 5,5 \text{ Nm}$ (screw quality 8.8)
Weight:	
4/2-way (2 solenoid)	m = 2,4 kg
4/3-way	m = 2,4 kg
4/2-way (1 solenoid)	m = 1,8 kg

**HYDRAULIC SPECIFICATIONS**

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$ ) refer to data sheet 1.0-50/2
Viscosity range	12 mm <sup>2</sup> /s...320 mm <sup>2</sup> /s
Fluid temperature	-20...+70°C
Working pressure	
in port P, A, B	$p_{max} = 350 \text{ bar}$
Tank pressure	
in port T	Medium: $p_{max} = 160 \text{ bar}$ Super: $p_{max} = 200 \text{ bar}$
Max. volume flow	$Q_{max} = 30 \text{ l/min}$ , see characteristics
Leakage volume flow	see characteristics

**ELECTRICAL CONTROL**

Construction Solenoid, wet pin push type, pressure tight  
 Standard-nominal voltage  $U_N = 12 \text{ VDC}, 24 \text{ VDC}$   
 $U_N = 110 \text{ VAC}^*, 115 \text{ VAC}^*, 230 \text{ VAC}^*$   
 $AC = 50 \text{ to } 60 \text{ Hz}$   
 \* Rectifier integrated in the plug, other nominal voltages and nominal performances on request.  
 Voltage tolerance  $\pm 10\%$  of nominal voltage  
 Protection class IP 65 to EN 60 529  
 Relative duty factor 100% DF (see data sheet 1.1-430)  
 Switching cycles Since switching is damped and slow, the switching frequency is of secondary importance.  
 Operating life  $10^7$  (number of switching cycles, theoretically)  
 Connection/Power supply Over device plug connection to ISO 4400/ DIN 43 650, (2P+E), other connections on request.

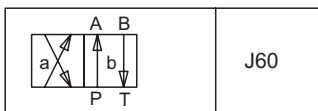
**SOLENOID DESCRIPTION**

With respect to the selection of the solenoid, the following statements are important:

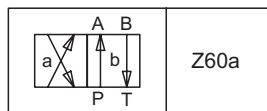
- The solenoid is the most expensive component of the solenoid spool valve.
- For this reason, it is not economical to use the same solenoid for all applications.
- Depending on the application, sales area, and customer, the requirements for solenoid spool valves and solenoids differ very considerably.
- In order to be able to offer the customer an optimum, we can supply our solenoid spool valves NG6 in 2 different versions:
  - Medium SIN45V (data sheet 1.1-120)
  - Super SIS45V (data sheet 1.1-125)

**TYPE LIST / DESIGNATION OF SYMBOLS**

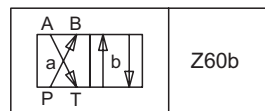
4/2-way valve with 2 solenoids



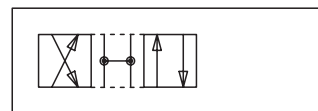
4/2-way valve with spring reset operation A-side



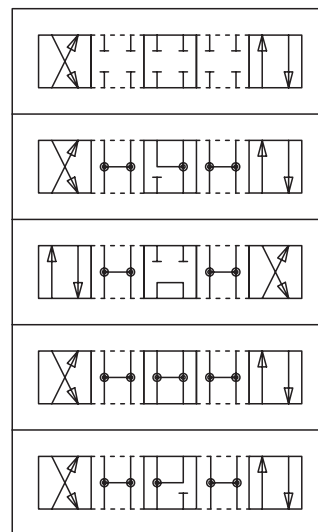
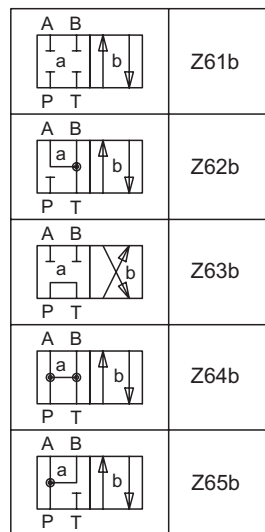
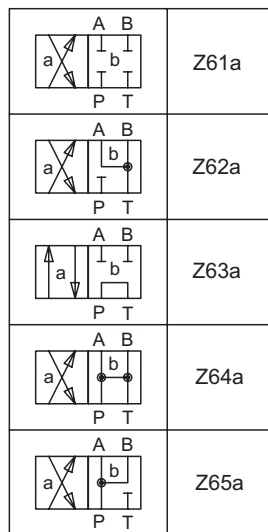
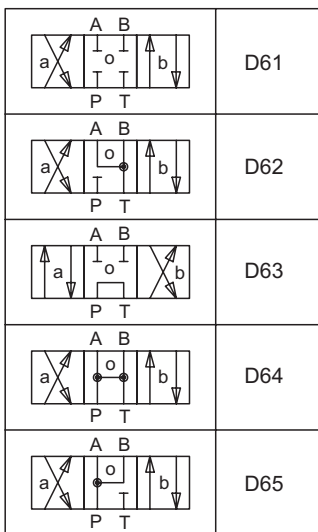
operation B-side

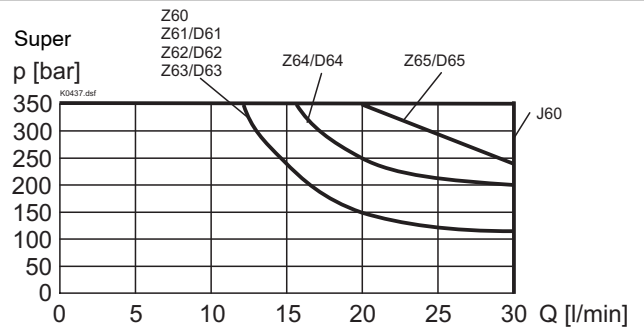
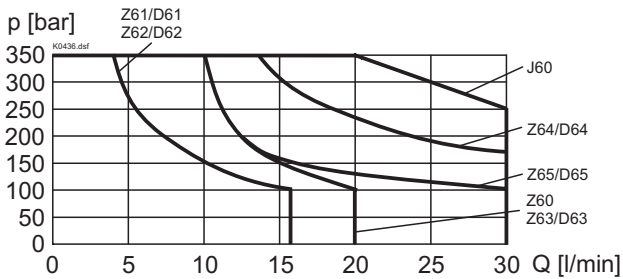
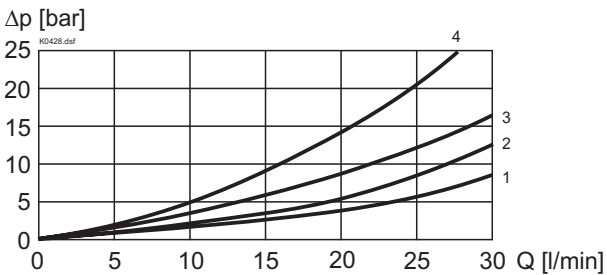


Transitional functions

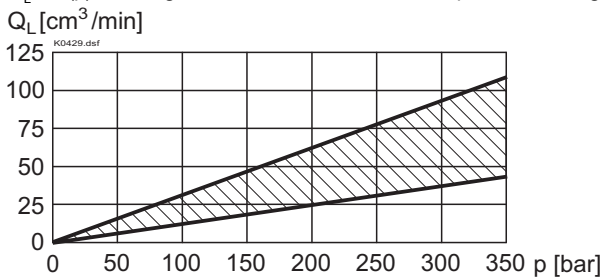


4/3-way valve spring centered



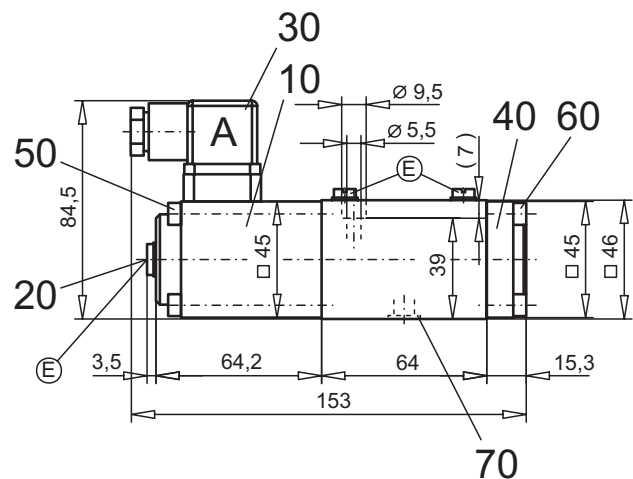
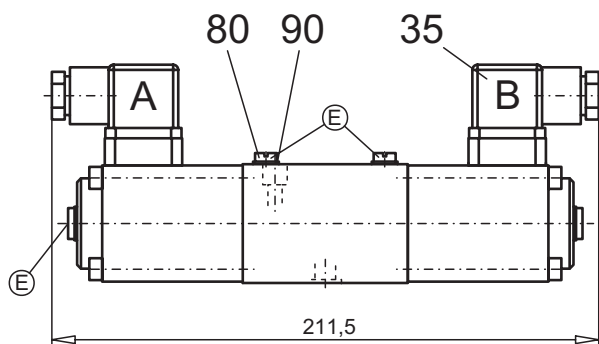
**CHARACTERISTICS** Oil viscosity  $\nu = 30 \text{ mm}^2/\text{s}$ 
 $p = f(Q)$  Performance limits with standard voltage -10%  
 Medium

 $\Delta p = f(Q)$  Pressure drop volume flow characteristics


Symbol	Pressure drop curve no.	Volume flow direction				
		P - A	P - B	P - T	A - T	B - T
Z60/J60	2	2	2	-	2	2
D61/Z61	2	2	2	-	2	2
D62/Z62	2	2	2	-	1	1
D63/Z63	4	4	4	3	4	4
D64/Z64	1	1	1	-	1	1
D65/Z65	1	1	1	-	2	2

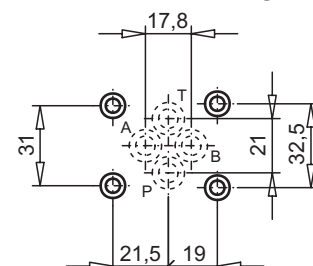
 $Q_L = f(p)$  Leakage volume flow characteristics per control edge

**DIMENSIONS**

 4/3-way valve (spring centered)  
 4/2-way valve (with 2 solenoids)

4/2-way valve (spring reset)

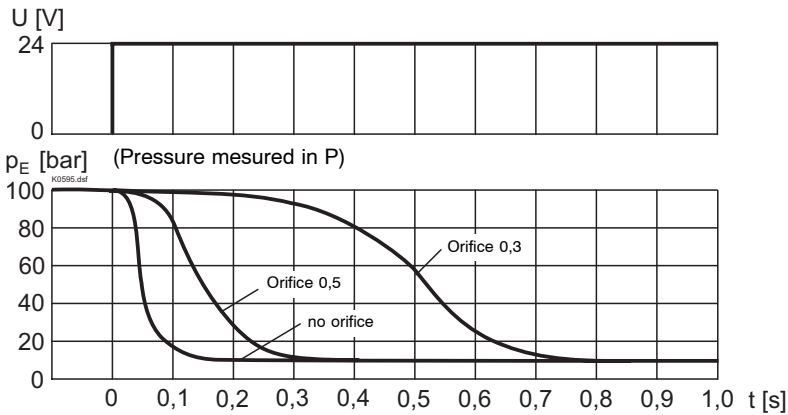


E = air bleed screw

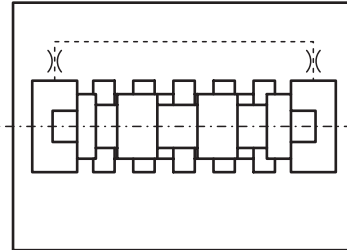


**SHIFTING TIMES** Influence of orifices on shifting  
 Measured with AMW4D61-G24 Flow Q = 7 l/min

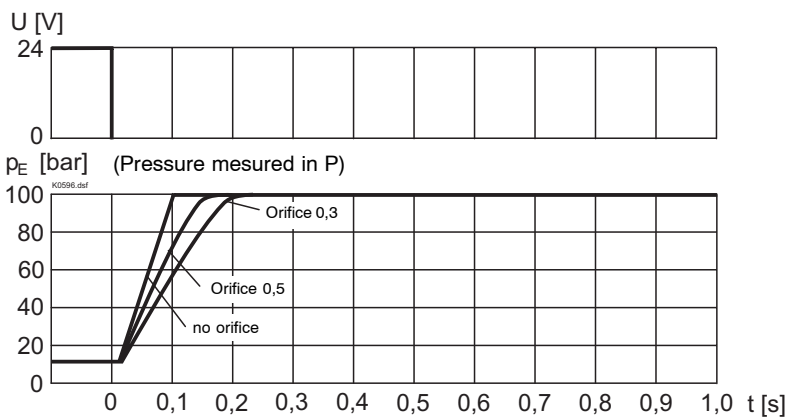
Solenoid energised



Orifices in valve body influence shifting time



Solenoid deenergised


**PARTS LIST**

Position	Article	Description
10	260.6 ... 260.7 ...	Medium-solenoid SIN45V Super-solenoid SIS45V
20	239.2033	Plug HB0 (incl. seal)
30	219.2001	Plug A (grey)
35	219.2002	Plug B (black)
40	058.4200	Cover
50	246.2160	Socket head cap screw M5x60 DIN 912
60	246.2117	Socket head cap screw M5x16 DIN 912
70	160.2093	O-ring ID 9,25x1,78
80	246.2006	Socket head cap screw M5x6 DIN84 A
90	049.2050	Bonded seal ID 5,7x10x1

**ACCESSORIES**

 Threaded connecting plates, Multi-flange subplates and  
 Longitudinal stacking system see Reg. 2.9

Technical explanation see data sheet 1.0-100E